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REMARKS

Claims 20 and 21 are pending in this application. Claims 20 and 21 stand rejected under 35 USC 103 as being unpatentable over Smith and Cook in view of Mertens. The Applicant has amended the pending claims herein and provides the following remarks for the Examiner's consideration.

Cook uses addition polymers to avoid the handling and dispersion problems associated with condensation polymers that he discusses at column 1, line 35 through column 2, line 54. Addition polymerizations are carried out in one of four general ways; in bulk, in solution, in suspension or in emulsion, as described by Cook at column 2, line 59 through column 3, line 23. Cook describes incorporating alumoxanes as fillers into various polymers. Importantly, the addition polymerizations that are described in Cook's epoxy Examples 15-18 are all particle additions via bulk polymerization, as is typically done for solvent-free epoxy systems. Because epoxy resins are solid or are highly viscous at room temperature, Cook teaches that it is necessary to "gently warm" the resin to make it mobile during mixing (see column 12, lines 36-41). In his epoxy Examples 15-18, the highest temperature that Cook describes is 35-45 °C.. While Cook does describe "vigorous stirring" at column 12, line 41, he nonetheless is teaching only a mixture of the particles in the resin (see "thoroughly mixed" at column 12, line 43 and "mixture" at column 20, line 3).

In contrast, claim 20 has been amended herein to include specific limitations that make it clear that the present invention is directed to a method of increasing the thermal conductivity of an electrically insulating epoxy material that utilizes a solution polymerization rather than the bulk polymerization process that Cook teaches for epoxies. Claim 20 now includes the limitations of stirring the LCT-epoxy resin with the anhydriding agent "at approximately 60° C. ... until a clear solution is formed." The elevated stirring temperature of the present invention is above the melting temperature of the resin and is well above the temperatures described in the prior art, thus allowing a solution to be formed rather than the mixture that is formed by utilizing the lower temperature process of Cook. Even extending the mixing time in the process of Cook

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would not inherently result in the claimed clear solution, because there can be no total dissolution even with prolonged stirring if the melting point of the epoxy resin is not exceeded.

The amended claim 20 also includes the limitations of "after the solution is clear, adding a boehmite material into the clear solution and stirring at approximately 60° C. until the solution is again clear." This step-ordered stirring process allows the crystalline domains of the LCT epoxy-anhydride solution to stabilize and to interlock with the anhydride molecules before the addition of the alumoxane. Cook adds alumoxane directly to the epoxy resin. In the present invention, the epoxy and anhydride are combined to obtain a clear, homogeneous solution before the alumoxane is added. If alumoxane were added directly to the epoxy as in Cook, a phase separation would occur and the claimed homogeneous solution would not be obtained.

Further, the stirring of the present invention is extended in duration after the addition of the boehmite material until the solution is again clear, thus forming "a uniform dissolution of the boehmite material substantially free of particle wetting and with essentially complete co-reactivity of the boehmite material with the LCT-epoxy anhydride." The particle mixture processes and resultant two-phase epoxy materials described by Cook in his epoxy examples, even as applied to the Smith LCT epoxy, do not provide for such a complete and uniform dissolution substantially free of particle wetting.

Further, the present invention allows the boehmite material to enter solution and thus become again clear prior to the addition of the accelerator. Nothing in the cited prior art teaches or suggests this ordered combination of steps.

Also, the method of claim 20 "is effective to produce homogeneous alumoxane-LCT-epoxy-anhydride polymers that retain the layered nature of the LCT-epoxy resin and are substantially free of micro-void formation and that exhibit a dielectric strength of at least 1.2 kV/mil while at the same time exhibiting thermal conductivity of at least 0.50 W/mK in a transverse direction and at least 0.99 W/mK in a thickness direction in an environment of 25°C." If one were to apply the epoxy mixtures of Cook to the Smith LCT epoxy resin, as suggested by the Examiner, the resultant mixture would

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inherently include micro-voids, as do all mixtures, and thus importantly would not inherently produce an insulating material with the claimed properties. The polymer of claim 21 produced by the temperature specific and step ordered method of claim 20 are demonstrably novel and non-obvious because they provide an electrically insulating epoxy material having the unexpected and heretofore desired by unrealized elevated thermal conductivity when compared to the properties of the prior art Bisphenol A and LCT epoxy resins that are described at paragraph 0006 of the present published application.

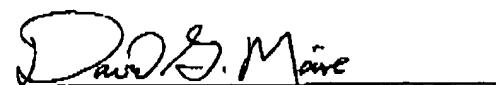
In summary regarding claims 20 and 21, the Examiner's proposed use of the Cook methods with the LCT epoxy of Smith lacks important processing details that are delineated in the amended claims of the present invention. Without the hindsight of the present invention, there is nothing in the cited art that would motivate one skilled in the art to further modify the process of Cook to include the temperature specific and order specific steps of the present invention. The claimed method is effective to produce the claimed polymer exhibiting heretofore unachievable and unexpected thermal conductivity and electrical insulating properties.

New claim 22 is presented herein including the limitation of dissolving zinc naphthenate into the solution as the accelerator. This contrasts with the process of Mertens wherein zinc naphthenate is added to a substrate such as cloth or mica tape prior to the infusion of an accelerator-free resin. The addition of the process of Mertens to the combination of Smith and Cook would not provide the presently claimed homogeneous solution and polymer, since the infusion of accelerator-free resin over an accelerator-laden substrate would result in an uneven multi-phase mixture with varying regions of excessive and insufficient amounts of accelerator concentrations.

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Reconsideration of the application and allowance of claims 20-22 are respectfully requested.

Respectfully submitted,



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